WHAT IS CLAIMED IS:

1. A chrome plated part comprising a substrate having a crack-free chrome layer on a surface thereof, the crack-free chrome layer having compressive residual stress and being formed by plating.

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2. A chrome plated part according to claim 1, wherein the compressive residual stress in the crack-free chrome layer is 100 MPa or more.

3. A chrome plated part according to claim 1 or 2, wherein the crack-free chrome layer has a crystal grain size of 9 nm or more.

11 ~~4~~. A chrome plated part according to claim 10 ~~3~~, wherein the crystal grain size of the crack-free chrome layer is less than 16 nm.

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5. A chrome plated part according to claim 1, wherein the crack-free chrome layer is a lower chrome layer and the chrome plated part further comprises a cracked upper chrome layer which is formed on the lower chrome layer by plating.

6. A chrome plated part according to claim 5, further comprising at least one intermediate chrome layer which is formed between the lower chrome layer and the upper chrome layer by plating.

8 ~~7~~. A chrome plated part according to any one of claims 1, 4 ~~3~~ and 7 ~~6~~, further comprising an oxide film containing $Cr_2O_3$ as an outermost layer thereof.

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8. A chrome plating method comprising the step of conducting electroplating of a work in a chrome plating bath by application of a pulse current, the chrome plating bath

containing organic sulfonic acid, to thereby deposit a crack-free chrome layer on a surface of the work, the crack-free chrome layer having compressive residual stress.

9. A chrome plating method according to claim 8, wherein the compressive residual stress in the crack-free chrome layer is set to a level of 100 MPa or more by adjusting a waveform of the pulse current.

~~10~~ 15. A chrome plating method according to claim ~~8~~ 14 or ~~9~~ 13, wherein the crack-free chrome layer is formed to have a crystal grain size of from 9 nm to less than 16 nm by adjusting a waveform of the pulse current.

~~11~~ 19. A chrome plating method according to claim ~~8~~ 14, further comprising the step of conducting, after the pulse plating, electroplating of the work in the same chrome plating bath as the chrome plating bath for the pulse plating, by one of adjustment of a waveform of the pulse current and application of a direct current, to thereby deposit a cracked upper chrome layer on the crack-free chrome layer.

~~12~~ 20. A chrome plating method according to claim ~~8~~ 14, further comprising the steps of:

conducting, after the pulse plating, electroplating of the work in the same chrome plating bath as the chrome plating bath for the pulse plating, by one of adjustment of a waveform of the pulse current and application of a direct current, to thereby deposit an intermediate chrome layer on the crack-free chrome layer; and

conducting electroplating of the work in the same chrome plating bath as the chrome plating bath for the pulse

plating, by one of adjustment of the waveform of the pulse current and application of the direct current, to thereby deposit a cracked upper chrome layer on the intermediate chrome layer.

21 ~~13~~. A chrome plating method according to claim 19 ~~11~~ or 20 ~~12~~, wherein the chrome layers are deposited by continuous operation by continuously moving the work in the chrome plating bath.

22 ~~14~~. A chrome plating method according to claim 19 ~~11~~ or 20 ~~12~~, wherein the chrome layers are deposited by batchwise operation by immersing the work in the chrome plating bath.

16 ~~15~~. A method for producing a chrome plated part, comprising the steps of:

conducting the chrome plating method of claim 14 ~~8~~;

polishing the crack-free chrome layer on the surface of the work; and

conducting heat oxidation, to thereby form an oxide film containing $Cr_2O_3$ on a surface of the crack-free chrome layer.

23 ~~16~~. A method for producing a chrome plated part, comprising the steps of:

conducting the chrome plating method of claim 19 ~~11~~ or 20 ~~12~~;

polishing the upper chrome layer formed on the crack-free chrome layer on the surface of the work; and

conducting heat oxidation, to thereby form an oxide film containing $Cr_2O_3$ on a surface of the upper chrome layer.

17. A method according to claim 16 ~~15~~, wherein the heat

oxidation is conducted under the same conditions as conditions of a baking process.

~~18~~. A method according to claim ~~15~~ 14, wherein the heat oxidation is conducted by high-frequency heating.

24 ~~19~~. A method according to claim ~~16~~ 23, wherein the heat oxidation is conducted under the same conditions as conditions of a baking process.

25 ~~20~~. A method according to claim ~~16~~ 23, wherein the heat oxidation is conducted by high-frequency heating.

2 ~~21~~. A chrome plated part according to claim 1, wherein the chrome layer has a crystal grain size of 9 nm or more.

3 ~~22~~. A chrome plated part according to claim ~~21~~ 2, wherein the crystal grain size of the chrome layer is less than 16 nm.

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23. A chrome plated part according to claim 5, wherein the upper chrome layer has compressive residual stress.

24. A chrome plated part according to claim 23, wherein the compressive residual stress in the upper chrome layer is less than 100 MPa.

25. A chrome plated part according to claim 5, wherein the upper chrome layer has tensile residual stress.

26. A chrome plated part according to any one of claim 23 to 25, wherein the upper chrome layer has a crystal grain and the crystal grain has a size less than 9 nm.

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27. A chrome plated part comprising:

a substrate having a surface; and

a chrome layer deposited on the surface of the substrate,



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the chrome layer having compressive residual stress.

28. A chrome plated part according to claim 27, wherein the chrome layer is deposited on the surface of the substrate by plating.

29. A chrome plating method comprising the steps of:

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providing a substrate having a surface; and

depositing a chrome layer on the surface of the substrate so that the chrome layer has compressive residual stress.

30. A chrome plating method according to claim 29, wherein in the depositing step the chrome layer is deposited on the surface of the substrate by plating.

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